

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 2 of 25

This listing of the claims replaces all prior versions in the application.

**Listing of Claims:**

1. (Currently Amended) A method for performing a hearing evaluation test over a computer network, comprising the steps of:

administering a hearing evaluation test to a patient using a computer network, the hearing evaluation test comprising a plurality of hearing assessment signals at selected frequencies and hearing levels;

transmitting commands from a test administration site to a local patient testing site during said administering step;

generating the hearing assessment signals at the local patient site in response to said transmitting step; and

interactively relaying information between the patient located at the local site and a clinician located at the test administration site during said administering step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site; and

controlling the output of the hearing assessment signals during the administering step such that the clinician at the test administration site determines which hearing assessment signals of the generating step are relayed locally to the patient.

2. (Currently Amended) A method for performing a hearing evaluation test over a computer network, comprising the steps of:

administering a hearing evaluation test to a patient using a computer network, the hearing evaluation test comprising a plurality of hearing assessment signals at selected frequencies and hearing levels;

transmitting commands from a test administration site to a local patient testing site during said administering step;

generating the hearing assessment signals at the local patient site in response to said

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 3 of 25

transmitting step;

interactively relaying information between the patient located at the local site and a clinician located at the test administration site during said administering step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site; and

~~A method according to Claim 1~~, wherein the computer network is a global computer network, and wherein the interactively relaying information step is carried out to allow the clinician to selectively initiate a second test stimuli after receiving a patient's response to a first test stimuli during said administering step.

3. (Currently Amended) A method for performing a hearing evaluation test over a computer network, comprising the steps of:

administering a hearing evaluation test to a patient using a computer network, the hearing evaluation test comprising a plurality of hearing assessment signals at selected frequencies and hearing levels;

transmitting commands from a test administration site to a local patient testing site during said administering step;

generating the hearing assessment signals at the local patient site in response to said transmitting step;

interactively relaying information between the patient located at the local site and a clinician located at the test administration site during said administering step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site; and

~~A method according to Claim 1~~, further comprising the step of adjusting the output of a hearing assessment signal during said administering step based on the response of the patient and a command sent from the remote site.

4. (Original) A method according to Claim 1, wherein the hearing evaluation test assessment signals are sufficient in number and variation of frequency and sound intensity to

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 4 of 25

allow the clinician to perform a diagnostic hearing evaluation.

5. (Previously Presented) A method according to Claim 4, wherein the auditory tone presentation of the hearing assessment signals during said administering step meets predetermined test standards.

6. (Currently Amended) A method for performing a hearing evaluation test over a computer network, comprising the steps of:

administering a hearing evaluation test to a patient using a computer network, the hearing evaluation test comprising a plurality of hearing assessment signals at selected frequencies and hearing levels, wherein the hearing evaluation test assessment signals are sufficient in number and variation of frequency and sound intensity to allow the clinician to perform a diagnostic hearing evaluation, and wherein the auditory tone presentation of the hearing assessment signals during said administering step meets predetermined test standards;

transmitting commands from a test administration site to a local patient testing site during said administering step;

generating the hearing assessment signals at the local patient site in response to said transmitting step;

interactively relaying information between the patient located at the local site and a clinician located at the test administration site during said administering step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site;

A method according to Claim 5, further comprising the steps of:

transmitting a command from the test administration site to increase the sound intensity level of at least one of the plurality of hearing assessment signals relayed to the patient at the local site during said administering step; and

transmitting a command from the test administration site to decrease the sound intensity levels of at least one of the plurality of hearing assessment signals during said administering step.

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 5 of 25

7. (Original) A method according to Claim 1, wherein said interactively relaying step includes relaying dynamic audiovisual communications of the patient at the local site to the test administration site during said administering step.

8. (Previously Presented) A method according to Claim 7, further comprising the step of determining the ambient noise level at the local site and transmitting data regarding the determined noise level to the remote site prior to and/or during said administering step.

9. (Original) A method according to Claim 1, further comprising the step of controlling the sound intensity of the hearing assessment signals delivered to the patient from said test administration site.

10. (Currently Amended) A method for performing a hearing evaluation test over a computer network, comprising the steps of:

administering a hearing evaluation test to a patient using a computer network, the hearing evaluation test comprising a plurality of hearing assessment signals at selected frequencies and hearing levels;

transmitting commands from a test administration site to a local patient testing site during said administering step;

generating the hearing assessment signals at the local patient site in response to said transmitting step;

interactively relaying information between the patient located at the local site and a clinician located at the test administration site during said administering step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site; and

controlling the sound intensity of the hearing assessment signals delivered to the patient from said test administration site,

~~A method according to Claim 9~~ wherein the clinician adjusts the sound intensity of a

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 6 of 25

selected frequency of the hearing assessment signals which are delivered to the patient responsive to the patient's response to a particular hearing assessment signal frequency transmitted thereto.

11. (Withdrawn) A method according to Claim 1, wherein the hearing evaluation test assessment signals are sufficient to allow the clinician to measure (a) middle ear pressure and compliance characteristics and (b) acoustics reflexes.

12. (Original) A method according to Claim 1, wherein the hearing evaluation test measures at least one of transient and distortion product emission levels in the ear.

13. (Original) A method according to Claim 9, further comprising the step of accepting user input by the patient during said administering test.

14. (Original) A method according to Claim 13, wherein said accepting step is carried out by the patient contacting at least one of a switch and a key on a keyboard.

15. (Original) A method according to Claim 13, wherein said accepting step is carried out by the patient speaking into a microphone.

16. (Original) A method according to Claim 15, wherein the patient speech input is automatically converted to textual feedback to the clinician via voice recognition software.

17. (Original) A method according to Claim 16, wherein said accepting step is carried out by visual feedback to the clinician of the response of the patient during said administering step.

18. (Original) A method according to Claim 1, wherein the local site is a clinic.

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 7 of 25

19. (Original) A method according to Claim 18, wherein the local site is a pediatrician's office.

20. (Original) A method according to Claim 1, wherein the local site is an industrial site.

21. (Original) A method according to Claim 1, further comprising the step of scheduling an appointment time suitable to the patient and the clinician in advance of said administering step.

22. (Original) A method according to Claim 21, wherein said scheduling step includes obtaining health provider information and assigning a patient identification number.

23. (Original) A method according to Claim 22, wherein said scheduling step includes applying for insurance approval.

24. (Original) A method according to Claim 23, wherein said scheduling step includes accepting an electronic deposit of money to reserve the desired appointment time.

25. (Original) A method according to Claim 23, wherein the requested appointment time is confirmed in an electronic message transmitted to the patient based on receipt of insurance provider approval.

26. (Original) A method according to Claim 1, wherein the hearing assessment signals are carried out at a plurality of frequencies in the range of between about 20-20,000Hz.

27. (Original) A method according to Claim 26, wherein the hearing assessment signals comprise tones representing both speech and non-speech signals at frequencies in the range of between about 125-12,000Hz.

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 8 of 25

28. (Original) A method according to Claim 26, further comprising the step of controlling the tone presentation of the hearing assessment signals such that the harmonic distortion is less than about 1%.

29. (Original) A method according to Claim 28, wherein the hearing evaluation conforms to standardized ANSI requirements.

30. (Previously Presented) A method according to Claim 1, wherein said interactive relaying step includes relaying at least one of audio, audiovisual, visual, and text-based interactive messages between the patient and the clinician in substantially real time during said administering step.

31. (Original) A method for delivering a diagnostic hearing test over a global computer network from a test administration site to a patient site, comprising the steps of:  
generating, at a patient site, a plurality of hearing assessment signals at frequencies in the range of about 20-20,000Hz;

transmitting, to the patient, a plurality of hearing assessment signals from said generating step, the plurality of hearing assessment signals being sufficient in number and variation of frequency and sound level intensity to provide enough information to the test administration control site to allow a diagnostic hearing evaluation to be performed by a clinician thereat according to predetermined standards;

controlling the output of the hearing assessment signals which are relayed to the patient during said transmitting step at a local site from a test administration site which is remote from the patient site, wherein said controlling step is carried out such that a clinician at the test administration site determines which hearing assessment signals of said generating step are relayed locally to the patient,

accepting patient input indicating when each of the plurality of hearing assessment signals from said transmitting step becomes audible thereto during said transmitting step; and

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 9 of 25

diagnosing the hearing ability or hearing loss of the patient at the test administration site away from the patient site.

32. (Previously Presented) A method according to Claim 31, wherein the controlling step comprises electronically observing at the remote site, testing conditions, measurements and/or patient responses at the local site in substantially real time to determine which hearing assessment signals are generated at the local site.

33. (Original) A method according to Claim 32, wherein the hearing assessment signals comprise tones representing speech and non-speech signals at at least eight different frequencies in the range of between about 125-12,000Hz.

34. (Original) A method according to Claim 32, further comprising the step of controlling the tone presentation of the hearing assessment signals such that the harmonic distortion is less than about 1%.

35. (Previously Presented) A method according to Claim 31, wherein the diagnostic hearing test conforms to standardized requirements.

36. (Withdrawn) A method according to Claim 31, further comprising locally obtaining measurements associated with assessing acoustic reflexes, and middle ear pressure and compliance characteristics based on commands transmitted from the remote test administration site.

37. (Previously Presented) A method according to Claim 31, further comprising evaluating distortion product emission levels in the ear.

38. (Currently Amended) ~~A method according to Claim 1,~~ A method for performing a hearing evaluation test over a computer network, comprising:



Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 10 of 25

administering a hearing evaluation test to a patient using a computer network, the hearing evaluation test comprising a plurality of hearing assessment signals at selected frequencies and hearing levels;

transmitting commands from a test administration site to a local patient testing site during said administering step;

generating the hearing assessment signals at the local patient site in response to said transmitting step; and

interactively relaying information between the patient located at the local site and a clinician located at the test administration site during said administering step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site,

wherein the administering step comprises:

serving web pages from a web server associated with a diagnostic hearing test device at the local patient site to a web client which indicate a status of the diagnostic hearing test;

receiving requests from the web client which provide parameters for performing the diagnostic hearing test during the diagnostic hearing test; and

controlling operation of the diagnostic test device based on the parameters of the received request from the web client so as to provide control of the diagnostic hearing test.

39. (Original) A method according to Claim 38, wherein the requests from the web client are common gateway interface (CGI) requests which specify parameters for performing the diagnostic tests.

40. (Original) A method according to Claim 38, further comprising the step of automatically periodically requesting web pages from the server so as to periodically update the status of the diagnostic hearing test.

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 11 of 25

41. (Original) A method according to Claim 38, further comprising the step of downloading to the web client an applet which periodically reloads a current web page of the web client so as to periodically update the status of the diagnostic hearing test.

42. (Original) A method according to Claim 41, wherein a frequency with which the applet reloads the current web page is based on the current web page.

43. (Original) A method according to Claim 42, wherein the step of downloading is carried out for each initial serving of a web page to a client.

44. (Original) A method according to Claim 38, wherein the diagnostic hearing test comprises measuring middle ear pressure and compliance characteristics.

45. (Original) A method according to Claim 38, wherein the hearing evaluation test comprises measuring transient and/or distortion product emission levels in the ear.

46. (Withdrawn) A hearing evaluation device, comprising:  
a web server;  
a diagnostic test device operably associated with the web server and configured so as to be controlled by the web server; and  
wherein the web server is further configured to serve web pages to a web client which indicate a status of a diagnostic hearing test, receive requests from the web client which provide parameters for performing the diagnostic hearing test, and control operation of the diagnostic test device based on the parameters of the received request from the web client.

47. (Currently Amended) A hearing evaluation device for generating hearing assessment signals at a local patient site, comprising:  
a local processor configured to communicate over a computer network;

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 12 of 25

a tone generator operably associated with the processor, wherein, in operation, said tone generator is configured to generate tones at a plurality of selected frequencies in the frequency range of between about 20-20,000Hz;

an output device operably associated with the tone generator, wherein, in operation, said output device is adapted to deliver the tones of the hearing assessment signals to a patient undergoing a hearing evaluation; and

an input device operably associated with the processor, said input device configured to indicate a patient's response to each of the tones of the hearing assessment signals;

wherein the hearing evaluation device is configured to receive commands from a remote site through said processor over the computer network during the hearing evaluation to allow the remote site to select and/or adjust the tones generated by the tone generator.

48. (Original) A hearing evaluation device according to Claim 47, further comprising:  
a microphone configured to detect ambient noise; and  
an audio analyzer in electrical communication with the microphone for measuring the sound level detected by the microphone.

49. (Currently Amended) A device according to Claim 48, wherein the device is portable and configured to operate independently of a local computer and allow substantially real-time interactive communication between the local and remote sites during the hearing evaluation.

50. (Withdrawn) A method of controlling a hearing test, the method comprising the steps of:

serving web pages from a web server associated with a hearing test device to a web client which indicate a status of the hearing test;

receiving requests from the web client which provide parameters for performing the hearing test; and

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 13 of 25

controlling operation of the hearing test device based on the parameters of the received request from the web client so as to provide control of the hearing test.

51. (Withdrawn) A method according to Claim 50, wherein the hearing test comprises obtaining a biotelemetry measurement of the ear of the subject for evaluating at least one of middle ear pressure and compliance characteristics or transient and/or distortion product emission levels in the ear.

52. (Withdrawn) A method according to Claim 50, wherein the hearing test comprises a diagnostic hearing test of selected tones.

53. (Withdrawn) A method according to Claim 52, wherein the requests from the web client are common gateway interface (CGI) requests which specify parameters for performing the diagnostic hearing test.

54. (Withdrawn) A method according to Claim 50, further comprising the step of automatically periodically requesting web pages from the server so as to periodically update the status of the hearing test.

55. (Withdrawn) A method for performing a hearing evaluation test over a computer network, comprising the steps of:

obtaining at least one of a tympanometric measurement of middle ear pressure and compliance or the measurement of evoked otoacoustic emissions of a patient using a computer network;

transmitting commands from a remote test administration site to a local patient testing site during at least a portion of said obtaining step;

generating the hearing assessment signals at the local patient site in response to said transmitting step in substantially real-time; and

relaying data between the local site to a clinician located at the test administration site

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 14 of 25

in substantially real-time during at least a portion of said obtaining step so that the clinician can evaluate the patient's response to the hearing assessment signals, the test administration site being remote from the local site.

56. (Withdrawn) A method of controlling a electrophysiological auditory evaluation test using one or more of otoacoustic emissions and tympanometry, the method comprising the steps of:

serving web pages from a web server associated with an otoacoustic auditory evaluation test device configured to measure otoacoustic emissions including at least one of middle ear compliance and cochlear hair cell responses, to a web client which indicates a status of the otoacoustic evaluation test;

receiving requests from the web client which provide parameters for performing the otoacoustic evaluation test; and

controlling at least a portion of the operation of the test based on the parameters of the received request from the web client.

57. (Withdrawn) A hearing evaluation device, comprising:

a web server;

a diagnostic test device operably associated with the web server and configured so as to be controlled by the web server; and

wherein the web server is further configured to host socket connections to a web client that provide data that indicates a status of a diagnostic hearing test, receive requests from the web client that provides parameters for performing the diagnostic hearing test, and control operation of the diagnostic test device based on the parameters of the received request from the web client.

58. (Previously Presented) A method according to Claim 1, wherein the administering, transmitting, generating and relaying steps comprise:

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 15 of 25

hosting a socket connection at a web server located at a local patient site for the transfer of data associated with a diagnostic hearing test device at the local patient site to a remote client which indicates a status of the diagnostic hearing test;

establishing test parameters of the hearing test device over the hosted socket connection;

controlling operation of the diagnostic test device over the hosted socket connection based on the parameters received from the client over the hosted socket connection so as to provide control of the diagnostic hearing test;

receiving results associated with the diagnostic hearing test at the client over the hosted connection; and

wherein the steps of establishing, controlling and receiving are carried out so as to in sufficient number and variation of frequency and sound level intensity to provide enough information to the client to allow a diagnostic hearing evaluation to be performed by a clinician in substantially real-time according to predetermined standards.

59. (Original) The method according to Claim 58, further comprising:  
pinging the web server to determine if the web server is available; and  
requesting status of the diagnostic hearing test device from the web server if pinging the web server indicates that the web server is available.

60. (Previously Presented) A system configured to perform a hearing evaluation test over a computer network, comprising:

a portable local communication device comprising an interface having a web server and controller configured to communicate over a computer network with a remote clinician test administration site in substantially real-time during a diagnostic hearing evaluation test; and

a local audiometer in communication with the controller and configured to selectively output a plurality of hearing assessment signals controlled by the remote test site via the web server during the hearing test and receive patient responses thereto.

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 16 of 26

61. (Previously Presented) A system according to Claim 60, wherein the remote site is configured to control attenuation of a primary stimulus signal output by the audiometer.

62. (Previously Presented) A system according to Claim 60, wherein the system is configured to allow the remote site to control audiometer outputs using the portable communication interface, the audiometer outputs including remotely selectable: ear routing, air/bone conduction operation, transducer operation, stimulus on/off, test signal intensity and test signal frequency.

63. (Previously Presented) A system according to Claim 60, wherein the local interface is configured to operate independently of a local personal computer and allow substantially real-time interactive communication between the local and remote sites during the hearing evaluation.

64. (Previously Presented) A system according to Claim 60, wherein the audiometer comprises a tone hearing test mode that can generate test signals over a plurality of frequencies and a biotelemetry mode that can measure middle ear pressure, compliance characteristics, changes and/or distortion product emission levels.

65. (Currently Amended) A system according to Claim 60, wherein the system is configured to provide substantially real-time interaction between the audiometer and a clinician at the remote site to allow the clinician to control a testing protocol and carry out a diagnostic hearing evaluation in substantially real-time.

66. (Previously Presented) A system according to Claim 60, wherein the system is configured to allow a clinician at the remote site to receive a first patient response corresponding to a first test stimuli, then selectively initiate a suitable next test stimuli that is transmitted to the patient.

Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 17 of 25

67. (Previously Presented) A system according to Claim 66, wherein the system is configured to carry out hearing tests that comply with predetermined standardized testing codes.

68. (New) A method according to Claim 1, wherein the computer network is a global computer network, and wherein the interactively relaying information and controlling steps are carried out to allow the clinician to selectively initiate a second test stimuli after receiving a patient's response to a first test stimuli during said administering step.

69. (New) A method according to Claim 1, wherein the controlling step comprises adjusting the output of a hearing assessment signal during said administering step based on the response of the patient and a command sent from the remote site.

70. (New) A method according to Claim 1, wherein the controlling step comprises transmitting a command from the test administration site to increase the sound intensity level of at least one of the plurality of hearing assessment signals relayed to the patient at the local site during said administering step; and transmitting a command from the test administration site to decrease the sound intensity levels of at least one of the plurality of hearing assessment signals during said administering step.

71. (New) A method according to Claim 1, wherein the hearing evaluation test is a diagnostic hearing evaluation test, and wherein the administering and controlling steps are carried out to allow a clinician at the remote site to perform the diagnostic hearing evaluation test in substantially real-time.

72. (New) A method according to Claim 2, wherein the hearing evaluation test assessment signals are sufficient in number and variation of frequency and sound intensity to allow the clinician to perform a diagnostic hearing evaluation, wherein the auditory tone presentation of the hearing assessment signals during said administering step meets



Attorney Docket No.: 5218-88  
Application No.: 10/068,016  
Filed: February 5, 2002  
Page 18 of 25

predetermined test standards, and wherein the administering step is carried out to allow a clinician at the remote site to perform the diagnostic hearing evaluation test in substantially real-time.

73. (New) A method according to Claim 3, wherein the hearing evaluation test assessment signals are sufficient in number and variation of frequency and sound intensity to allow the clinician to perform a diagnostic hearing evaluation, and wherein the auditory tone presentation of the hearing assessment signals during said administering step meets predetermined test standards.

74. (New) A method according to Claim 6, wherein the hearing evaluation test assessment signals are sufficient in number and variation of frequency and sound intensity to allow the clinician to perform a diagnostic hearing evaluation, and wherein the auditory tone presentation of the hearing assessment signals during said administering step meets predetermined test standards.

75. (New) A method according to Claim 10, wherein the hearing evaluation test assessment signals are sufficient in number and variation of frequency and sound intensity to allow the clinician to perform a diagnostic hearing evaluation, and wherein the auditory tone presentation of the hearing assessment signals during said administering step meets predetermined test standards.

76. (New) A device according to Claim 47, wherein the hearing evaluation device is configured to provide assessment signals that are sufficient in number and variation of frequency and sound intensity to allow the clinician to perform a diagnostic hearing evaluation from the remote site, wherein the auditory tone presentation of the hearing assessment signals meets predetermined test standards, and wherein the hearing device is configured to allow a clinician at the remote site to perform the diagnostic hearing evaluation test in substantially real-time.